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Projective properties of divergence-free symmetric tensors, and new dispersive estimates in gas dynamics. (English) [Zbl 07462041](#)

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Summary: The class of Divergence-free symmetric tensors is ubiquitous in Continuum Mechanics. We show its invariance under projective transformations of the independent variables. This action, which preserves the positiveness, extends Sophus Lie's group analysis of Newtonian dynamics. When applied to models of gas dynamics – such as Euler system or Boltzmann equation, – in combination with Compensated Integrability, this yields new dispersive estimates. The most accurate one is obtained for mono-atomic gases. Then the space-time integral of $t\rho^{\frac{1}{d}}p$ is bounded in terms of the total mass and moment of inertia alone.

MSC:

35Q31 Euler equations

35B06 Symmetries, invariants, etc. in context of PDEs

35B30 Dependence of solutions to PDEs on initial and/or boundary data and/or on parameters of PDEs

35B45 A priori estimates in context of PDEs

35F35 Systems of linear first-order PDEs

35Q20 Boltzmann equations

Keywords:

divergence-free symmetric tensors; gas dynamics; projective linear group

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